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(56) Documents cited  
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(58) Field of search  
E1J

## (54) Door

(57) A door has a frame-work of aluminium or extruded UPVC sections 1 with steel reinforcement 2, the faces being panels 4 of moulded GRP material, which are bonded by epoxy resin adhesive to the sections 1, covering the opposite faces of these sections, leaving only the external edges of the frame-work exposed. Thus, the joints 5 between the sections 1 and the panels 4 are exposed only at the edges 6 of the door and are inconspicuous. The central space of the door is filled with high density PVC foam material 3.

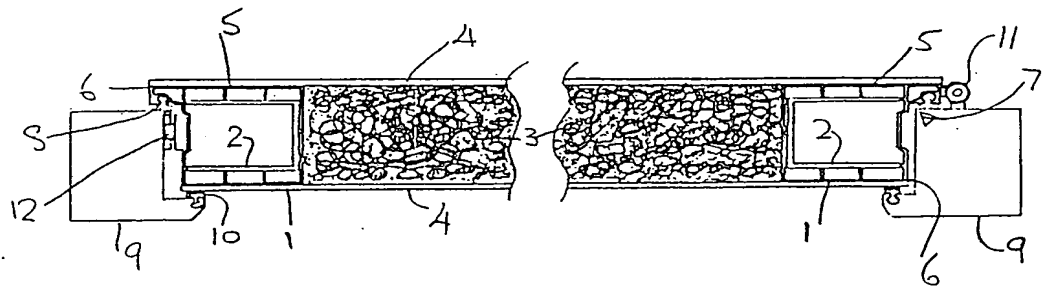


FIGURE 1

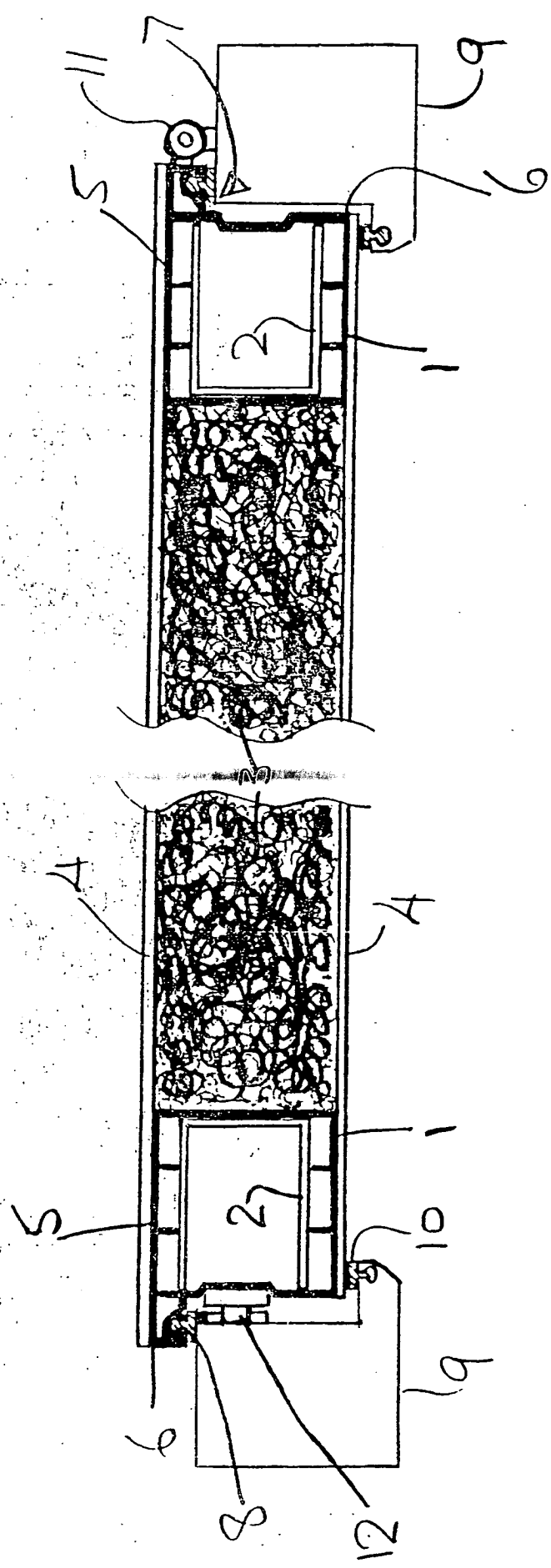


FIGURE 1

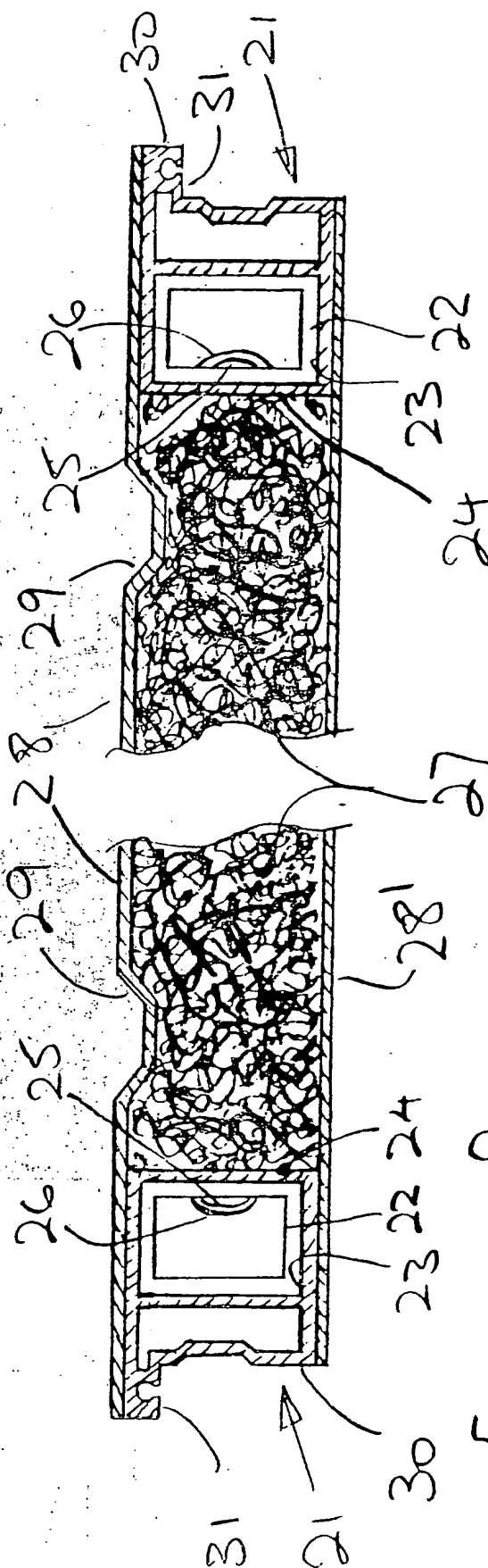


FIGURE 2

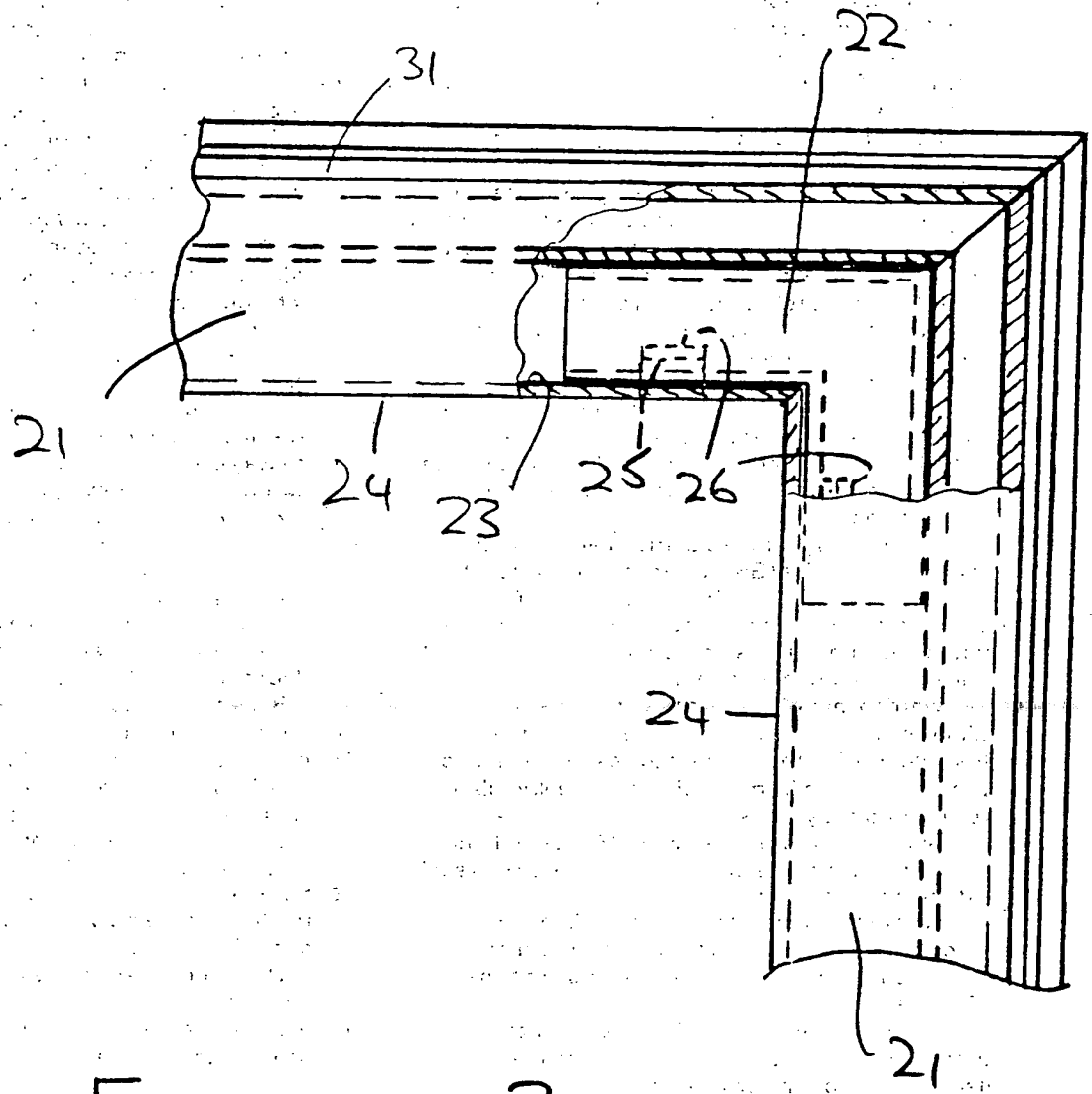


FIGURE 3

## SPECIFICATION

## A door

- 5 The present invention relates to a door, and in particular to an exterior or entrance door.

Conventional wooden exterior doors are susceptible of decay and usually require periodic maintenance. Recently UPVC doors have become available. These are restricted to being in the form of a frame-work with in-fill panels. These panels are usually of glass, but may be of plastics material mouldings.

UPVC exterior doors, which are constructed from mouldings mitre-welded at the corners and normally reinforced with steel, have met increasing market acceptance. A feature of them is generally that they include an edge rebate at which a seal is provided. This, together with a second seal provided on the fixed door-frame renders the doors particularly draught proof as is required of an exterior door. Nevertheless the doors have limitations in that the in-fill panels cannot easily be arranged to be flush with the surrounding frame-work. This can give rise to an unsightly appearance of apparently a door within a door.

Accordingly I proposed to manufacture glass reinforced plastics (GRP) doors having the rebate and seal of UPVC doors for use with UPVC fixed door-frames, but also having one piece side panels without the unsightly step from frame-work to in-fill panel. Although these doors are successful, they are awkward to manufacture in that there are so many different sizes of door that standard moulds are not feasible. Further they require to be kept in conditions preventing them from warping for a week whilst the resin completely cures.

I have also experimented with GRP panels bonded onto a wooden frame-work and discovered that such a door is not a feasible production item due to inherent movement in the timber available. Such a wooden framed door can not be relied upon to remain sufficiently flat for the double seals to be effective.

With this situation in mind, I have sought in my present invention to provide a door which lends itself to high volume production.

The door of my invention comprises:-  
a frame-work fabricated from material formed as elongate lengths of regular cross-section and composition and  
one-piece side panels bonded to the frame-work to cover the full lateral extent of the frame-work and to leave exposed the edges of the frame-work defining the edges of the door.

The frame-work of the door may be of extruded UPVC material as presently used in UPVC doors and normally including reinforcing steelwork. Alternatively the frame-work may be of extruded aluminium. Such a frame-work is stiff enough not to require reinforcing. In appropriate circumstances the frame-work material could be rolled as opposed to extruded.

The outer panels may be of moulded GRP material. Alternatively they may be of vacuum or pressure

formed sheet plastics material, typically UPVC.

The door has sufficient dimensional stability that it is envisaged that adequate sealing could be achieved with a single seal provided at a door-frame rebate. However the door itself is preferably provided with a sealing rebate (for double sealing), the frame-work including a door edge rebate which is left exposed at the edges of the door after bonding on of the side panels.

Conveniently the frame-work is such as to accommodate a multi-locking mortice lock.

The interior of the door, between the members of the frame-work, may be filled with foam material to provide rigidity to the outer panels. At an appropriate height in the door a wooden in-fill may be provided so that a letter box opening may be cut out. Alternatively a letter box opening may be moulded into the side panels. Where an upper part of the door is to be glazed, the side panels are appropriately moulded with a rebate for a glazing bead and an aperture.

To help understanding of the invention, two specific embodiments thereof will now be described by way of example and with reference to the accompanying drawings, in which:-

*Figure 1* is a horizontal cross-section through a door in accordance with the invention fitted into a fixed door frame;

*Figure 2* is a view similar to *Figure 1* showing another door in accordance with the invention; and

*Figure 3* is a corner detail of the frame-work of the door of *Figure 2*.

Referring first to *Figure 1*, the door therein shown is rectangular with a generally similar vertical and horizontal cross-section. Accordingly its structure may be understood by reference to the horizontal cross-section of *Figure 1* alone. The door has a rectangular frame-work of extruded UPVC sections 1. These are heat-welded at the corners. The frame-work includes steel reinforcement 2. The method of assembly of the frame-work is as conventionally used for UPVC doors.

The central space of the door is filled with foam plastics material 3, typically high density PVC foam material, cemented in position with resin. The faces of the door are of plastics material panels 4. These may be of GRP mouldings or UPVC, ABS or other vacuum formable and UV stabilised sheet plastics material. The panels 4 are bonded, for instance by epoxy resin adhesive or chemical welding with a solvent adhesive, to the extruded sections 1 of the frame-work.

The arrangement of the frame-work and the panels is such that joints 5 are exposed only at the edges 6 of the door and are therefore inconspicuous. If for any reason the bond at the edges is conspicuous, it can be concealed by so-called flow coating.

The sections 1 have a rebate 7 with a seal 8 for sealing against the face of the door-frame 9, which is of conventional construction. The door-frame 9 has a second seal 10 for providing double sealing. The door is hung in the frame by hinges 11 and closed by a multi-locking mortice 12. Normally the door will be supplied together with the door-frame.

As required to support a letter plate (not shown),

the door may include a central wooden horizontal member (not shown) also bonded to the panels 4. The panels 4 will normally include a moulded contour to simulate the appearance of a

5 conventional timber door.

Figure 2 shows another door in accordance with the invention, in which the extruded sections 21 are of aluminium giving sufficient stiffness that they do not require reinforcement in the manner of the  
10 Figure 1 door. The frame-work sections 21 are mitred at the corners of the door and a right-angle piece 22 is fitted into the voids 23 in the sections 21, see Figure 3. The two limbs of the angle piece are a close fit with the voids 23 of the respective sections to be  
15 joined at the corner in question. With the frame-work assembled and angle pieces in position at each corner, the inner edges 24 of the sections 21 are deformed into crimps 25 which extend into crimps 26 also formed in the corresponding members of the  
20 right-angle pieces. Although this is not the only method of joining the frame-work - welding or screwing could be employed - it provides a particularly convenient, quick and strong joint.

The door of Figure 2 has foam plastics filling  
25 material 27 and side panels 28, 28', one of which 28 has a moulded contour 29 and the other of which is plain. The skins are GRP mouldings suitably coloured. They are bonded to the aluminium frame-work with an epoxy adhesive which slightly  
30 etches the metal to create a key for itself. At the exposed edge 30, including the rebate 31 for a seal (not shown), the aluminium is painted to match the colour of either or both of the panels 28, 28'. The paint is applied to this edge during manufacture of  
35 the aluminium section, typically electrophoretically or by powder coating. The paint is hard and well bonded so that further painting through the life of the door is not expected to be necessary.

The foam plastics filling material 27 may be of  
40 polyurethane or PVC foamed in situ or again of polystyrene slab cut to size and adhered to the panels.

The invention is not intended to be restricted to the details of the above described embodiments. For  
45 instance the frame-works could be of extruded GRP material.

#### CLAIMS

- 50 1. A door comprising:-  
a frame-work fabricated from material formed as elongate lengths of regular cross-section and composition and  
one-piece side panels bonded to the frame-work to  
55 cover the full lateral extent of the frame-work and to leave exposed the edges of the frame-work defining the edges of the door.
2. A door as claimed in claim 1, wherein the frame-work is a rectangular frame-work of horizontal  
60 and vertical sections secured together at the corners and the one-piece side panels are bonded to the opposite side faces of the sections of the frame-work to cover those faces.
3. A door as claimed in claim 1 or claim 2, in  
65 which the frame-work is of extruded UPVC material.

4. A door as claimed in claim 3, in which the frame-work includes reinforcing metalwork.

5. A door as claimed in claim 1 or claim 2, in which the frame-work is of extruded aluminium.

70 6. A door as claimed in any preceding claim, in which the panels are of moulded plastics material.

7. A door as claimed in claim 6, in which the material is GRP material.

8. A door as claimed in any of claims 1 to 5, in  
75 which the panels are of vacuum or pressure formed plastics material.

9. A door as claimed in claim 8, in which the panel material is UPVC.

10. A door as claimed in any preceding claim, in  
80 which a door edge sealing rebate is left exposed at the edges of the door after bonding on of the side panels.

11. A door as claimed in any preceding claim, in which the frame-work is such as to accommodate a  
85 multi-locking mortice lock.

12. A door as claimed in any preceding claim, in which the interior of the door between the frame-work members and the side panels is filled with foam material.

90 13. A door as claimed in any preceding claim, in which a wooden in-fill is provided so that a letterbox opening may be cut out.

14. A door as claimed in any of claims 1 to 12, in which letterbox openings are moulded into the side  
95 panels.

15. A door as claimed in any preceding claim, in which the side panels are appropriately moulded with a rebate or rebates for a glazing head or heads and an aperture or apertures.

100 16. A door substantially as hereinbefore described with reference to Figure 1 of the accompanying drawings.

17. A door substantially as hereinbefore described with reference to Figures 2 and 3 of the  
105 accompanying drawings.